ABSTRACT

A sequential processing reactor vessel and method is disclosed for accelerated extraction and fractionation of chemical analytes from complex solid sample materials. The device and method provide for sequential extraction of elemental constituents from solid materials by sequentially contacting target samples within a single reaction vessel using a series of different reagents at temperatures as high as 150° C and pressures up to 150 psi to accelerate reactions. The aggressive chemical treatments provided by the disclosed device and method enable the complete digestion of solid samples in liquid analyte samples that can be directly analyzed by conventional spectrometry or other suitable methods. The disclosed device and method provide for efficient sample processing and accelerated reactions to significantly reduce processing times and costs for elemental analysis of solids while improving accuracy, precision and reliability of results compared to conventional devices and methods. The disclosed device and method are compatible with both conventional convection and radiant heating sources as well as microwave heating and can be readily adapted to marine, geological, environmental, industrial and research solids analysis applications.